A FUNCTIONAL ANALYSIS OF A CENTRAL SERVICE UNIT

Marion Irene Dacey August, 1955

Dacey, Marion Irene
1955

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A FUNCTIONAL ANALYSIS

OF A

CENTRAL SERVICE UNIT

A Thesis

Presented to

the Faculty of the School of Nursing

Boston University

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

by

Marion Irene Veasy

August, 1961

First Reader:

Second Reader:

Third Reader:

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CHAPTER I

INTRODUCTION

Internal research is coming more and more to the foreground as the accepted method of dealing with operational problems. It studies specific problems within a given hospital situation, and is usually auxiliary to an immediate task or job. Perhaps the word "search" is a better description of this type of activity[1]--a search for improved methods of doing things. When it comes to better ways of doing things in a hospital, the most natural place for ideas to start is with the nurses, the ones who are responsible for the service.[2] Thus, internal research lends itself particularly well to nursing studies. The very term research implies that the studies be controlled. The Central Service Unit, therefore, with its assembly line techniques presents the fewest possible variables and provides an ideal workshop for such studies. This area has been selected by the writer because of an existing urgency to expand services on the one hand and cut costs on the other, at a time when personnel shortages have become the rule rather than the exception.

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[1]Joseph P. Peters, "Administrative Research Has Practical Value," The Modern Hospital, Vol. 81, No. 5: p. 83, November, 1953.

[2]Will Ross, "Ideas for Improving Hospital Equipment," A.J.N., Vol. 51, No. 5: p. 332, May, 1951.

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I. STATEMENT OF PROBLEM

This study aims specifically to explore and analyze the physical plant and some of the activities of the Central Service Unit in a 393 bed General Medical and Surgical Federal Hospital, and, on the basis of findings, to recommend measures to promote maximum efficiency in operation. In order to formulate conclusions with relation to the main problem, the study will attempt to answer the following questions with regard to the physical plant and activities:

A. Physical Plant
   1. What resources are available?
   2. Are they being used to best advantage?
   3. Are they adequate?
   4. What modifications, if any, are indicated?

B. Activities
   1. What activities are being carried on?
   2. Is the proper person performing the activity?
   3. Is the activity being performed as expeditiously as possible?
   4. What recommendations, if any, are indicated?

II. SCOPE OF STUDY

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II. SCOPE OF STUDY

Some limitations are placed on the study at the outset:

A. Studies will be conducted and analyzed by the workers themselves who are not experienced in work simplification or research techniques. Therefore the studies will probably not be as objective or reliable as they might be if conducted by experts. However, the workers are well motivated and the total involvement of them seems to justify the approach.

B. The urgency for expanded services exists and should be met as quickly as possible. Research must be concentrated and persistent, therefore, with all possible results put into immediate effect. Since each operation will be analyzed individually, the resulting improvements will undoubtedly have impact on the succeeding operations studies.

C. This being a government institution, changes in the physical plant, if proposed, and purchases involving large expenditures, must receive prior Central Office approval and await allocation of funds. Testing of potential effects then, cannot be included in this paper.

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III. METHODS OF APPROACH

The problem was approached first of all through an exploration of available literature on the following subjects:

A. Research Methods

B. Central Service

C. Work Simplification

D. Hospital Furnishings and Equipment

E. Hospital Plans and Revisions

From these sources certain methods of collecting facts and recording data were selected as suitable to the investigation at hand.

The descriptive method of research was decided upon as the most adaptable for a study such as this. In the descriptive method, a situation is surveyed, tested out and described interpretively in terms of all obtainable facts about it. To characterize it briefly, it may be said that descriptive research is fact finding with adequate interpretation.[3] In this particular study, two phases of descriptive research will be used; the research survey, which is an organized attempt to analyze, interpret and report the present status,[4] and the

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job and activity analysis, which involves the compilation of the details of human activity for the purpose of improvement.[5]

As the first step, each individual worker was instructed to prepare activities analyses sheets covering his or her participation in the activities of the department for one specified week. While this was in progress, pertinent photographs were taken in the department. With the assistance of the Engineering Division, a detailed floor plan scaled to size was drawn up to serve as a point of reference in describing the physical plant and in depicting proposed alterations.

Following this, the workers and the writer together conducted a critical survey of the physical plant. The facts obtained thereby were listed and studied in conjunction with the Engineering Division in order to determine what could or what could not be accomplished in view of existing construction.

Finally, conclusions were drawn, and suitable recommendations made.

IV. PLAN OF STUDY

The study is presented in the following manner:

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Chapter II describes the Central Service Unit, the services it provides and its staffing.

Chapter III presents the critical study of the physical plant.

Chapter IV describes the methods used in collecting and analyzing activities data, the results of these analyses, their interpretations and evaluations.

Chapter V outlines conclusions and presents recommendations.

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CHAPTER II

DESCRIPTION OF THE CENTRAL SERVICE UNIT

I. PHYSICAL FACILITIES

Over-all description. The six room unit is located near three elevators in the center wing on the third floor of the seven story hospital building. It has dumb waiter service to the lobby of each floor and telephone connections with all departments. Three of the six rooms are used as storage areas for oxygen, equipment, linen and unsterile supplies. The other three comprise the receiving area and workroom, the sterilizing and sterile irrigating solution room, and the sterile supply storage and dispensing room. The approximately fifteen hundred square feet of floor area is arranged to provide space for these operations as follows:

1. Receiving and Cleaning Area
2. Workroom
3. Linen and Supply Storage
4. Equipment and Supply Storage
5. Oxygen and Equipment Storage
6. Sterilizing and Solution Storage
7. Sterile Supply Storage and Dispensing

Table #1 indicates the location and size of these areas.

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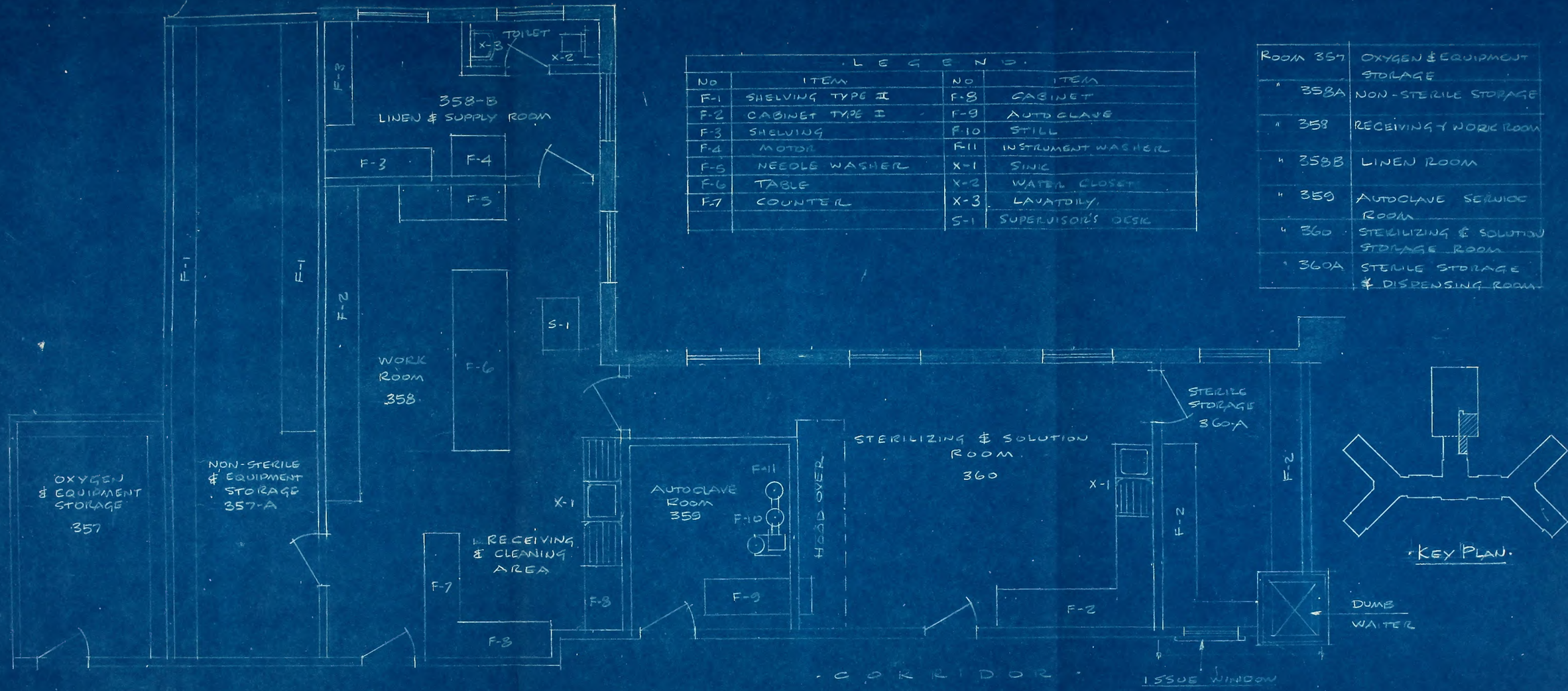

LEGEND.

No	ITEM	No	ITEM
F-1	SHELVING TYPE II	F-8	CABINET
F-2	CABINET TYPE I	F-9	AUTOCLAVE
F-3	SHELVING	F-10	STILL
F-4	MOTOR	F-11	INSTRUMENT WASHER
F-5	NEEDLE WASHER	X-1	SINK
F-6	TABLE	X-2	WATER CLOSET
F-7	COUNTER	X-3	LAVATORY
		S-1	SUPERVISOR'S DESK

Room 357	OXYGEN & EQUIPMENT STORAGE
" 358A	NON-STERILE STORAGE
" 358	RECEIVING & WORK ROOM
" 358B	LINEN ROOM
" 359	AUTOCLAVE SERVICE ROOM
" 360	STERILIZING & SOLUTION STORAGE ROOM
" 360A	STERILE STORAGE & DISPENSING ROOM

ORIGINAL PLAN.
SCALE 1/4" = 1'-0"

PLAN # 1

Receiving and Cleaning Area. Approximately one-quarter of the workroom floor space is designated as the receiving and cleaning area. Access to this area from the corridor is gained through a dutch door. Workspace consists of two metal topped, two-shelved counters placed at right angles to one another, a small closed cabinet, and a one basin enamel sink with two drainboards. All used equipment and supplies from the wards are checked in, inspected, and thoroughly cleaned in this area. The unit's one telephone is also located here.

Workroom. The remainder of the floor space is designated as the workroom proper and is divided into a processing area, a non-sterile supply storage area, and the supervisor's office.

Processing Area. The processing area work space consists of two rectangular tables placed end to end in the center of the room, a metal topped counter along the left hand wall, and a discarded examining table along the farther wall upon which rests a Casady Needle Cleaner. Six straight chairs and three stools complete the furnishings. In this area, needles are sharpened and washed, Central Service linen sorted, sets assembled and wrapped, and autoclave carriages loaded.

Non-Sterile supply storage area. The non-sterile

supply storage area, located along the left hand wall, consists of six recessed, glass encased cabinets above, and a counter below, beneath which are six units, each composed of one drawer and one two-shelved closed cabinet. The counter provides work space for assembling the sets and packaging the articles which are stored in the cabinets and drawers pending sterilization.

Supervisor's office. The supervisor's desk is against the right hand wall with a filing cabinet beside it. All clerical work, conferences and administrative activities of the department are conducted in this area.

Linen and Supply Storage Room. Off the farther end of the workroom, a small room having five tiers of shelving serves as a linen and supply storage room for articles used in the processing area. The needle washer air compressor is also located here against the wall directly behind the washer.

Equipment and Supply Storage Room. A long, narrow room opening off the receiving area to the left, and completely lined with shelves, provides storage space for all parenteral solutions, and for rubber goods, various items of supply delegated to Central Service for dispensing in order to provide more economical control, and portable equipment including oxygen gauges and masks. Large cartons of supplies

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and items of equipment such as suction machines and intravenous standards are lined up the center of the room and across the end wall.

Oxygen and Equipment Storage. A small room directly beyond the equipment and supply storage room provides storage space for empty and full oxygen cylinders, for oxygen tents, and for bed cradles and bed rails which are suspended from wall brackets. This room is not connected with the other five rooms in the unit, access being gained by means of a door opening off the corridor.

Sterilizing and Solution Storage. The sterilizing room is situated to the right of the workroom through an archway. Recessed along a wall panel are an American Sterilizing Company Instrument Washer-Sterilizer, a Barnstead Still and Sterilizer, and one large, rectangular, hand operated American Sterilizer Company Autoclave. Along the right hand wall are glass encased cabinets which continue along the adjoining wall. Here, sterile irrigating solutions are stored. On the latter wall next to the cabinets, there is a one-basin enamel sink with one drainboard. The Drinker-Collins Respirator is stored against the left hand wall of this room when not in use, the equipment storage room being too small to accommodate it.

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Sterile Supply Storage and Dispensing. This room opens off the sterilizing room through an archway. In it are located the dumb-waiter, several glass encased cabinets and tiers of drawers and closed cabinets wherein all sterile sets and supplies are stored for dispensing to ward units. Dispensing is done by dumb-waiter or through the issue window.

Additional storage space. In addition to the rooms described above, tub-rooms on two ward units on the second and third floors have been designated as storage areas for Stryker and Foster frames, and for station fabricated low beds, there being insufficient storage space in the department for such large items of equipment.

Ventilation. Ventilation is provided by several windows, two corridor doors, and two fans which are strategically placed in the workroom.

Lighting. Lighting is provided through windows and from incandescent overhead light fixtures with 200 watt bulbs and frosted shades. One gooseneck lamp is attached to the needle cleaning table.

II. SERVICES PROVIDED

The unit services nine wards, two clinics, the surgical dressing room, the blood bank, admitting office and pharmacy, maintaining control of all sterile supplies and special equipment used in the care and treatment of patients. It is

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responsible for requisitioning, storing, sterilizing, issuing, and manufacturing such equipment as is required. Sterile water, distilled water and similar items are likewise prepared in the Central Service Section. The section stocks hundreds of items which are issued, upon written request, to the various using divisions. Some articles are used infrequently or for a temporary period while others are issued routinely. Established systems of regularly scheduled deliveries of "common use" items are maintained by dumb waiter service to the lobby of each floor. Emergency requests are filled as necessary by the same route. The section is also responsible for maintaining a perpetual inventory of each item stocked in order to assure adequate levels of supplies.[1] A list of equipment and supplies dispensed follows:

III. EQUIPMENT AND SUPPLIES DISPENSED

ABD pads (all sizes)
Ace bandages--2, 3, 4, 5, and 6 inches
Adhesive tape, varied sizes
Air rings
Applicators, sterile
Atomizers
Bandages, Ace--2, 3, 4, 5, and 6 inches
Bard-Parker Blades with handles
Basins, small (irrigating)
Bed cradles, plain, folding

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Bedrails
Binders, Scultetus, T.
Blood Recipient Sets
Bone curettes
Bunyan bags, leg, arm
Burn Packs
Catheters: Rubber
Foley or Bardex
Robinson or French
Coude or Olive Tip
Nasal--rubber or plastic
Chest bottles
Clip remover, Michel
Cords, Extension
Cottonballs
Crotchet Hooks
Compress Heaters
Covers, ice cap and hot water bottle
Culture tubes
Deodorizers, electric
" , x-o
Distilled water
Dressings, 4 x 4's--4 x 8's
Drains, Penrose
Drinker-Collins respirator
Eye Pads
Elastoplast, 3"
Esophageal tubes with balloons
Footboards
Feeding cups
Finger cots
Fluff
Gauze packing, $\frac{1}{4}$, $\frac{1}{2}$, 1 inch, iodoform
Gloves, size 6, $6\frac{1}{2}$, 7, $7\frac{1}{2}$, 8, $8\frac{1}{2}$
Gloves, rectal
G.U. drainage tubing
Harris tubes
Hot water bottles
Hot water bottle covers
Ice caps
Ice cap covers
Ice collars
Ileostomy bags, belts, cement
Inhalators or vaporizers
Irrigating basins
Irrigating solutions
Isolation caps, masks, gowns
Isolation units

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Elastoplast, 3"
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Feeding cups
Finger cots
Fluff
Gauze packing, ¼", ½", 1 inch, iodoform
Gloves, size 6, 6½, 7, 7½, 8, 8½
Gloves, rectal
G.U. drainage tubing
Harris tubes
Hot water bottles
Hot water bottle covers
Ice caps
Ice cap covers
Ice collars
Ileostomy bags, belts, cement
Inhalators or vaporizers
Irrigating basins
Irrigating solutions
Isolation caps, masks, gowns
Isolation units

Intravenous solutions: Amino acids
Dextran
Dextrose in saline 5%, 10%
" in water 5%, 10%
Electrolyte solutions, D.G.
Plasma units
Ringer's solution
Sodium chloride, normal, 5%
Sterile water
Kelly pads
Lambs wool
Manometers, spinal
Medicine droppers
Medicine glasses
Miller-Abbott tubes
Moleskin
Muslin
Nasal oxygen sets
Oxygen
Oxygen analyzers
Oxygen gauges
Oxygen masks
Oxygen tents, bed, face
Nebulizers, aerosol
Needles:
Aspirating
Cardiac
Intramuscular
Intravenous
Spinal
Subcutaneous
Oiled silk
Oral thermometers
Oxygen (see Nasal)
Packing, gauze, $\frac{1}{4}$, $\frac{1}{2}$, and 1 inch
Pads, ABD
Penrose drains
Pillowcases, rubber, plastic
Pneumothorax machine
Post mortem boxes
Probes, 8"
Razor blades
Rectal thermometers
Restraints: Ankle and wrist
Posey safety belt
Respirator: Drinker-Collins
Rings, air
Rubber tubing
Safety pins, sterile

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Rubber tubing
Safety pins, sterile

Sandbags
Scissors, sharp, suture
Shields, eye
Shock blocks
Slides, glass
Speculums: Vaginal
Nasal
Specimen bottles
Solutions, irrigating
Stockinette, plain or bias
Stryker frames
Syringes, 2cc., 3cc., 5cc., 10cc., 20cc., 30cc., 50cc., 100cc.
Asepto, Ear, Insulin, Luer-lock, TBC
Stomach tubes with bulb and funnel (Ewald)
Sub-q-paks
Suction machines: Gomco
Fritz
Mucous aspirator
Stedman pumps
Suspensories
Thermometers, oral, rectal
Tongue depressors
Tourniquets
Tubes, Laryngectomy
Tubes, Tracheotomy, 3, 4, 5, 6, 7, 8
Tubing, glass, T, Y, angle, straight
Rubing, rubber
Blood and plasma infusion set
Hypodermoclysis set
Extension tubes for syringes
Intravenous set
Levine tubes
Harris tubes
Nasal catheters
Veno-paks
Vaporizer (Inhalator)
Vaseline gauze

<u>Special Trays</u>
Aspirating
Bladder irrigation
Catheterization
Compress
Ear irrigation
Esophageal balloon
Eye dressing
I.V. Cut-down
Incision and drainage

Sandbags
Scissors, sharp, suture
Shields, eye
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Intercostal
Liver biopsy
Myelogram
Novocaine Infiltration
Paracentesis
Pelvic
Pneumothorax
Proctoclysis
Spinal
Sternal
Suture
Throat irrigation
Tidal drainage
Tracheotomy
Thoracentesis
Urogram
Venous pressure
Water seal chest drainage

An alphabetical locator file has been established on all articles kept in Central Service. This file facilitates the rapid and accurate finding of all articles and has been designed to assist new personnel in their orientation to the department. It also acts as a confirmation on all equipment available.

IV. STAFFING

Complete service is provided daily between the hours of 7:00 a.m. and 4:30 a.m., and emergency service thereafter through the Nursing Office Supervisor. The staff consists of a nurse supervisor, a staff nurse, four full time aides and one part time aide supplemented by eight volunteers. The full time staff work an eight hour day, the part time aide approximately a three hour day, and the volunteers, varying

Intercostal
Liver biopsy
Myelogram
Novocaine Infiltration
Paracentesis
Pelvic
Pneumothorax
Proctoclysis
Spinal
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CHAPTER III

EVALUATION OF THE PHYSICAL FACILITIES

The workers together with the writer conducted a critical study of the physical facilities of the Central Service Unit in terms of the following criteria:

1. Safety of operations
2. Free flow of goods
3. Expediency of service
4. Economy of time, effort, and material

It was decided that the present location was in all probability the most advantageous in that it was located near the elevators and had possibilities for future horizontal expansion. However, it was readily recognized that several undesirable features existed which were definitely impeding efficiency in operations, and that if these features could not be improved in the present location, serious consideration should be given to relocation of the entire department. Accordingly, the Engineering Division was taken into the study early in order that valuable time would not be wasted in plans which could not be accomplished. Each work area was then analyzed minutely, first in terms of its particular function, and then in terms of its effect on over-all function. Detailed analysis follows:

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Detailed analysis follows:

I. RECEIVING AND CLEANING AREA

1. The arrangement of the receiving and cleaning area constitutes a bottleneck which makes the orderly, direct progression of goods impossible and presents a safety hazard.

2. The single basin sink is inadequate to meet the demands for processing of all used goods passing through the department and considerable time is being lost in waiting for the one basin to drain and refill. Further, it accomodates only one worker at a time making the washing process lengthy and tedious. These disadvantages are clearly illustrated in Figures 1 and 2.

3. The instrument washer is located in an adjacent room necessitating twenty-eight additional steps for each load of instruments to be washed.

4. The needle cleaner is located at the extreme end of the workroom, is not near a source of water, and is not connected to a drain. Each cleaning process, therefore, requires one complete trip of thirty-two steps to the still and three complete trips of twenty-four steps each between sink and machine, two to fill bottles and one to empty drainage pan. Figure 3 shows the needle cleaning process in operation.

II. WORKROOM

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II. WORKROOM

1. The work tables provided are not the thirty-six

inch standard recommended height at which workers may sit or stand, nor are chairs and stools of the proper type to permit good posture and eliminate fatigue. Figures 3 and 4 clearly illustrate this.

2. There are no bins, shelves or drawers in the work tables for storage of supplies needed in immediate processing. Consequently, work surface is obstructed, and several trips to the linen and storage room, averaging twenty-eight steps each, are necessary in the course of a day. Doorway to linen and supply storage room is shown in Figure 5.

3. Tables are stationary and cannot be readily moved to accommodate the various processing activities. Accordingly, goods must be handled twice in transport from cleaning area to processing area.

4. The supervisor's desk occupies sorely needed work room space and its location definitely violates the principles of good supervision. It is in a busy, noisy area which provides no privacy for conferences with workers, and it is positioned in such a way as to preclude the supervisor's overseeing their activities. In order to answer the telephone, which is located on the wall directly beneath the fan in the receiving area, (Figure 2) the supervisor must take twenty steps. The location of the supervisor's desk with respect to the processing area may be seen in Figure 5.

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FIGURE #1 RECEIVING AND CLEANING AREA VIEW #1

FIGURE #2 RECEIVING AND CLEANING AREA VIEW #2

FIGURE #3 PROCESSING AREA VIEW #1

FIGURE #4 PROCESSING AREA VIEW #2

FIGURE #5 · PROCESSING AREA VIEW #3

FIGURE #6 NON-STERILE SUPPLY STORAGE

III. NON-STERILE STORAGE AREAS

1. Storage areas for equipment and supplies are inadequate in floor space and arrangement, and in some instances are not advantageously located with respect to effective utilization and control of items stored.

   a. Shelving occupies wall space needed for cartons and large pieces of equipment, and equipment which could be suspended from brackets occupies floor space.

   b. Because of factors mentioned in 1. above, items which are used together are not stored together. For example, oxygen tanks and tents are in one room and gauges and masks in another.

   c. No suitable area is provided for large cartons or portable equipment which presently obstruct passageways in the storage areas, creating hazards and making procurement of stored items difficult. Figure 6 illustrates this.

   d. Storage areas designated for low beds and frames are too far removed from the department to make any type of servicing or control possible.

e. The Drinker-Collins Respirator, an expensive piece of equipment, is presently stored in the sterilizing room where it is subjected to extremes in temperature and humidity, no storage area being large enough to accommodate it.

2. Fifty per cent of the storage space in one supply room is taken up by parenteral solutions stored and dispensed for the pharmacy.

3. An average of thirty cylinders, full and empty, are stored in the oxygen storage room at any one time, taking up considerable space and requiring handling and record keeping by Central Service personnel. This one room represents the only oxygen storage facility for the entire station, oxygen being supplied from here to laboratories and machine shops as well as to ward units. Central Service personnel are responsible for transporting empty cylinders to the loading platform for pick-up by the contracting agency, and engineering division personnel deliver the full cylinders to the storage room.

IV. STERILIZING AND SOLUTION STORAGE AREA

1. The one autoclave is sorely pressed to meet the expanding needs of the service during a nine hour staffing period, a maximum of four loads per day being accomplished.

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1. The one autoclave is sorely pressed to meet the expanding needs of the service during a nine hour staffing period, a maximum of four loads per day being accomplished.

Considerable delay is encountered in waiting for loads to cool, and in emptying and refilling the one autoclave carriage.

2. The autoclave is hand controlled necessitating five trips from the workroom to the sterilizing room during each sterilizing period. These trips constitute interruptions for the workers and slow down processing.

3. During a nine hour staffing period, the water still is becoming inadequate to meet increasing demands from the pharmacy and two research laboratories, which demands are superimposed upon those from the nursing units. Since the reservoir is not large enough to hold the quantity which would be manufactured during the fifteen hour period that the department is unstaffed, the apparatus is turned off during that time.

4. Sterile storage space is inadequate. The only wall space suitable for additional cabinets is taken up by the sink which is used only as a source of water for flushing out the autoclave. This process is accomplished by means of an attachment and hose extending across the room which in turn constitutes a safety hazard.

5. The archway between the sterilizing room and the sterile supply storage room is too small to permit passage of the autoclave carriage. Accordingly, sterilized goods must be transferred to a smaller carriage before transporting

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V. STERILE SUPPLY STORAGE AND DISPENSING

Dumb-waiter service is provided only to the lobby of each floor. Each issue, therefore, necessitates a telephone call to the unit involved. There being no telephone extension in the dispensing area, the worker calls aloud to a worker in the receiving area who in turn telephones the unit. This creates noise, constitutes a source of annoyance in the Chapel located directly opposite, and interrupts the routine of the worker in the receiving area.

VI. VENTILATION

1. Air in the department may be changed only by opening the windows which allows dirt from the outside to enter. This dirt is then circulated through the department by the fans which are in operation much of the time. As a result, a dust film collects on equipment and floor and is blown into the storage cabinets as doors are opened. In the cabinets it settles on the sterile goods where the danger of its permeating the wrappers is likely. Consequently, these goods must be reopened, inspected, and resterilized at frequent intervals which is time consuming and contributes in no small measure to their deterioration.

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2. The fans in turn constitute a hazard as far as personnel health is concerned. Workers complain of drafts and seem to have had a fairly high rate of illness from respiratory ailments. However, the heat is so intense that, under the circumstances, fans seem necessary for comfort.

VII. LIGHTING

Lighting in the workroom is provided by one window and four overhead lights having two hundred watt bulbs and frosted shades. Workers complain that the lighting is poor at the wall counter, and that over the work table it tends to reflect on the monel ware being processed, throwing a glare. Lightmeter[1] tests were conducted, revealing that lighting along the wall counter is five foot-candles, and at the work table seven foot-candles. It is an established fact that 10-20 foot candles are needed for the type work done in this area.[2] Lighting throughout the remainder of the

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[1]Weston Photoronic Foot-Candle Meter, Weston Electrical Instrument Corporation, Newark, New Jersey.

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10-20 foot candles

"General manufacturing, textile mills, machine shops, fine assembly, proof reading, class rooms, general offices."

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In evaluating the physical facilities of our Central Service Unit, we have tried to be completely objective. We fully realize that planning is far more basic than a set of blueprints and that today's planning for tomorrow's hospital is difficult at best. We further recognize that flexibility of design for future change is essential, but that this is hard to incorporate in areas bounded by steel, brick and mortar.[3] The disadvantages listed, therefore, are not intended to imply deficiencies in the beginning planning.

Functions are bound to change as a result of the demands of medical and surgical practice and those arising through the development of new techniques, and advances in educational processes. In the past ten years, these demands have increased so rapidly that hospital designs in many instances are impractical and even inadequate before construction is completed. In this respect, our Central Service has been no exception, and necessary expansion has been accomplished piecemeal room by room, in response to immediate needs but with little or no regard for long range planning. As a result, actual floor space is adequate but arrangement is most inefficient. This evaluation has as its objective

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CHAPTER IV

METHODS OF COLLECTING AND ANALYZING ACTIVITIES DATA

For the most part the descriptive method of research is employed throughout the activities study with the workers themselves actively participating in the collection of data, its classification and analysis, and in the ensuing recommendations.

I. PREPARATION OF WORKERS

In order to prevent the threat to morale that is apt to be present whenever research which involves personnel is incompletely explained to them, the workers in the department were taken into the beginning phases of planning. In this way it was hoped that they would understand the plan, become interested in it, and feel they were contributing to it. The purpose of the program and the methods that would be used in collecting data were described, as well as the role which each worker was to play in the research. They were assured that there were no concealed evaluations planned, nor would there be any criticisms of individual activities or skills as a result of the study.[1] In order to further remove the

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II. INVESTIGATION OF ACTIVITIES

With relationships apparently on a firm footing and interest high, an investigation of activities was started. Each worker was instructed to keep an honest daily record of

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A. Repetitive tasks

B. Duplication of effort

C. Work simplification techniques

III. TALLYING OF ACTIVITIES

It is useless to collect facts unless they are properly analyzed, but before this can be accomplished, the collected facts must be assembled and sorted into their respective positions in order to get a properly balanced picture.[3] Analytical tables cannot be prepared directly from observation records, however. An intermediate step called tabulating the data is needed to bridge the gap. There are three ways of tabulating data: machine tabulation, hand sorting of tabulation cards and direct hand tallying from the observations made. A hand tally involves no special codes, elaborate

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equipment or knowledge of special computing devices.[4] Accordingly, it was selected as the method of choice in this study where tabulations were to be done by the workers themselves. After a review of the activities with the workers, ten general headings were agreed upon and appropriate work tables prepared for the tabulations. These headings were as follows:

1. Administration

   To include supervision, teaching, attendance at meetings and conferences, ordering and checking supplies, conducting interviews.

2. Collecting
3. Checking-In and Disassembling
4. Washing
5. Processing and Assembling
6. Autoclaving

   To include loading, unloading, and actual operation

7. Marking and Storing
8. Filling Requests
9. Housekeeping

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[4] Margaret G. Arnstein, How to Study Activities in a Patient Unit. Public Health Service Publication No. 370. U. S. Department of Health, Education and Welfare. Washington, D. C.: U. S. Government Printing Office, 1954. p. 24.

equipment or knowledge of special computing devices.[4] Accordingly, it was selected as the method of choice in this study where tabulations were to be done by the workers themselves. After a review of the activities with the workers, ten general headings were agreed upon and appropriate work tables prepared for the tabulations. These headings were as follows:

1. Administration

   To include supervision, teaching, attendance at meetings and conferences, ordering and checking supplies, conducting interviews.

2. Collecting
3. Checking-In and Disassembling
4. Washing
5. Processing and Assembling
6. Autoclaving

   To include loading, unloading, and actual operation

7. Marking and Storing
8. Filling Requests
9. Housekeeping

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10. Miscellaneous

To include telephone and other interruptions, errands, rest periods, and incidents of an unpredictable nature.

A minute was decided upon as the unit of time to be used and workers were instructed first to compute in minutes the time spent in each activity, following which the total in minutes was to be entered in the proper columns on the tabulation sheets.

This computation proved to be the most tedious and least appealing portion of the entire study as far as the workers were concerned and considerable prodding was necessary in order to accomplish the task. This lack of interest was attributed to the fact that the evaluation of the physical facilities was in progress concomitantly with the activities analysis. The workers were entering into the former most enthusiastically, presenting practical and useful suggestions. The results of their efforts along those lines were clearly visible and they were receiving recognition for them, whereas the results of tabulating the activities were too remote to provide the same degree of satisfaction. In other words, it was much more stimulating to speculate as to the best location for the needle washer, for instance, than it was to study the activities sheet and determine, among other things,

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whether checking needles for patency should be included under processing or washing. As was to be expected with workers untrained in collecting facts, there were some errors observed in the selection of columns. Difficulties were also encountered where sets of duties overlapped, and more particularly in determining whether certain interruptions were a necessary part of a particular function and whould be so recorded. Finally, however, confusion being resolved, the task of tabulating was completed.

The time spent in each activity was then computed into percentages for each type of worker, following which a table was prepared. Entries were made in the appropriate columns depicting the percentages of time spent in each activity by the supervisor, the staff nurse, the aides as a group and the volunteers as a group. Table II shows these entries. Then, in order to provide more graphic comparison, Figure 7 was prepared.

IV. INTERPRETATION OF ACTIVITIES CHARTS

Only after material collected has been summarized in the form of tables is it possible to draw conclusions from the study and make recommendations.[5] Both the table and the

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Table II

Average Percentages of Time Spent by Nurse and Non-Nurse Personnel in Activities of a Central Service Unit for a One Week Period, May 30 - June 5, 1954.

	1	2	3	4	5	6	7	8	9	10
	Administration	Collecting	Checking-In and Disassembling	Washing	Processing and Assembling	Autoclaving	Marking and Storing	Filling Requests	Housekeeping	Miscellaneous
NURSES										
SUPERVISOR	44	-	3	2	33	2	1	6	4	5
STAFF NURSE	1.5	-	1.5	2	66	4	10	6	-	9
NON-NURSES										
AIDES	-	5	6	16	41	4	7	7	5	9
VOLUNTEERS	-	-	4	1.5	75	-	9	.5	-	10

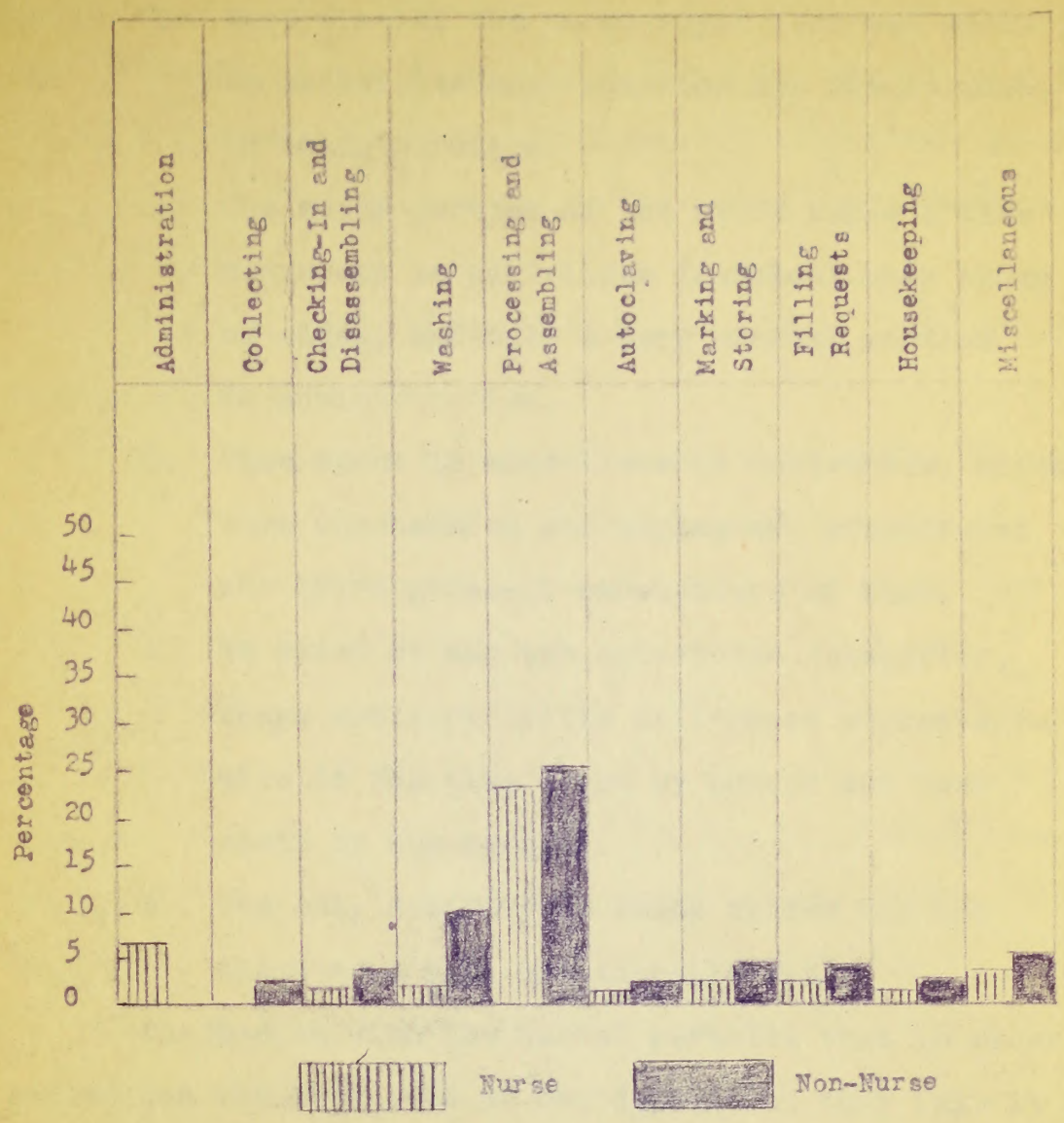

Figure 7. Graphic comparisons of percentages shown in Table II.

graph revealed facts of considerable interest, namely:

1. More time of the nurse supervisor was spent in activities not requiring her skills than in administration.
2. The major portion of the staff nurse's time was spent in activities identical with those of aides, and only a very minimal portion in administration.
3. Time spent in miscellaneous activities, which were unscheduled and unplanned, constituted the third greatest expenditure of time.
4. In seven of the ten activities categories, there was very little difference percentage-wise in the time spent by nurses and that spent by non-nurses.
5. The only activity in which nurses did not spend some time was in collecting.

Discussion with the nurses revealed that in order to accomplish the work load of the department they felt it was absolutely necessary for them to engage in all activities. However, they felt they were supervising, teaching and administering the department concurrently. It was further revealed that most of the time classified as administrative by the supervisor was spent in clerical duties associated with the checking and procurement of supplies, maintenance of

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records and inventories, and the revision of the procedure manuals and guides. The supervisor stated that these duties were so pressing and demanding of what time she could spare from the assembly line, that she had not found time to review and revise ward quotas which she felt were definitely in need of revision.

Consideration of these facts brings up some rather pointed questions:

1. Can nurses in Central Service effectively study over-all operations, plan and revise accordingly when they must be more concerned with producing than with seeing that production is maintained?

According to Finer, excessive business does not permit time for thought.[6] When nurses are too heavily burdened by the immediate task, they cannot think, investigate and set themselves to the task of inventing improvements.

2. Does this not constitute misuse of nursing skills at a time when such skills are at a premium?

Finer says that it is clear from abundant widespread evidence that from twenty to thirty per cent, and in some

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[6]Herman Finer, Administration and the Nursing Services (New York: The MacMillan Company, 1952), p. 48.

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3. Could some of the time spent in miscellaneous activities be salvaged and diverted into routine activities if the nurse supervisor herself were not so engrossed in these routine activities?

With respect to this, Finer says,

> It would seem that the job of supervisor implies the fulfillment of four main functions:
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> (1) To watch for the signs of poor service....
> (2) To inspire by ideals of service and the knowledge that she is on the watch.
> (3) To ask for suggestions and actions tending to improvement from her supervisees
> (4) To evaluate the services as a whole....[8]

Her place is not to do the job but to see that it is done.[9] It seems imperative, therefore, that more effective utilization of supervisory skills be promoted to the end that maximum production is achieved.

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4. How then could the supervisor be relieved of assembly line functions to devote more time to the proper functions of supervision?
5. How could the staff nurse be relieved of these same functions to devote more time to acquiring supervisory skills?

Obviously, some provision would have to be made for the assembly line functions presently carried by the nurses, but how to do so, when the other workers were already carrying a full load, was not so apparent.

V. METHODS ANALYSIS

It seemed, therefore, that the time had now arrived in the study for methods analysis. We knew <u>what</u> activities were being carried on, but perhaps if we knew <u>how</u> they were being carried on, methods could be improved to the extent that time saved would be sufficient to free the nurses from the shackles of the assembly line. Ritz E. Heerman, then president of the American Hospital Association, said in one of his reports,

> I do not believe there is any piece of equipment, or any part of a hospital that could not be improved if <u>all</u> of us gave a little thought to the subject and stimulated our imagination to propose changes that might be beneficial.[10]

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With this as a premise, then, an investigation of the methods being used to accomplish the workload was undertaken.

VI. SYRINGE PROCESSING

Since charts revealed that areas concerned with washing, processing and assembling were the most time consuming, it seemed reasonable to expect that appreciable dividends in terms of time saved were to be realized by direct attacks on each. The workers, however, expressed the desire to cross areas and study the complete syringe process from the time syringes entered the department until they were placed in the autoclave, rather than studying each area separately. They based their request upon the fact that the syringe process in itself involved many repetitious movements and considerable handling which might not be pointed up as plainly in an individual study of each area as such. The wisdom of their choice was recognized. Accordingly, the material which they had read in Barnes, Motion and Time Study[11] in preparation for the methods analysis was reviewed with them. The symbols to be used were selected, workers were instructed in the use of the chart upon which recordings would be made, and a standard stride was agreed upon for pacing off distance. Workers entered in the study enthusiastically. They were alert and

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keen in their observations, made careful entries, and willingly repeated questionable steps as often as necessary to secure proper facts. A description of the method of syringe processing currently in use follows:

On the ward units, used syringes are separated, rinsed and deposited, still separated, in boxes which are in turn placed in the unit Central Service box (along with all other used items being returned to the department). Unit boxes are collected twice daily by Central Service personnel and carried to the department where the contents are emptied, checked, sorted and processed. Syringes are taken from the boxes and placed in wire baskets which are in turn placed in tubs of detergent for soaking. They are then transported to the sink in the baskets, washed by hand, (four to ten syringes per handful according to size) and rinsed first under running water and then by immersing in a pail of distilled water. Following this, they are placed on a wheeled carriage and transported to the work table where matching, assembling, inspecting and packaging takes place. Matching is accomplished by comparing small numbers on the barrels and plungers. After the syringes are packaged, they are placed on a wheeled carriage, transported to the sterilizing room, transferred to the autoclave carriage and placed in the autoclave.

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and involving nineteen separate steps and a traveled distance of forty-seven feet. A process chart depicting these steps is presented in Figure 8. If, in addition, the time spent in loading and unloading the autoclave and in storing the sterilized product were to be included, the fact that syringe processing alone is taking the full time equivalent of the services of one worker each day cannot be refuted, nor the fact that this represents a major activity and a heavy expense salary-wise be denied.

The workers pointed out several factors which were extending the processing time considerably, chief among which are the following:

1. Syringes are mixed with other items in the ward boxes, making checking and sorting a difficult task involving much handling.

2. The one basin sink is a deterrent in washing in that the worker is non-productive a great deal of the time in draining and refilling the sink.

3. The numbers on syringes are exceedingly small, making matching a painstaking, lengthy task.

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SUMMARY

	Present	Proposed	Difference
Steps	19	9	10
Time Expended	6'45"	3'20"	3'25"
Distance Traveled	47 ft.	19 ft.	28 ft.

PROCESS CHART
Job: Processing Syringes

Chart Begins: In Receiving Area

Chart Ends: At Autoclave

DETAILS OF PRESENT METHOD

Steps	
1. Bring into department in ward boxes	Steps 1-4 inclusive take one hour
2. Unload from ward boxes and count	
3. Sort into baskets according to size	
4. Place baskets in detergent tubs	
5. Fill sink	Walk 3 feet
6. Fill pail with distilled water	Walk 28 feet
7. Carry baskets to sink	Walk 6 feet
8. Wash	4-10 per handful depending on size
9. Rinse under running tap water	
10. Rinse in distilled water	Steps 8-12 inclusive repeated 40 times.
11. Inspect for cleanliness	
12. Place on wheeled carriage	Steps 5-12 inclusive with repetition, take 1 hour, 15 minutes.
13. Transport to work table	Walk 5 feet
14. Inspect, match and assemble	Takes 1 hour, 40 minutes
15. Package	Takes 2 hours, 50 minutes
16. Transport to wheeled carriage	
17. Wheel to autoclave room	Walk 5 feet
18. Transfer to autoclave carriage	
19. Place in autoclave.	

Figure 8. Syringe Process Chart No. 1.

PROCESS CHART

Job: Processing Syringes

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VII. SUGGESTED IMPROVEMENTS

Prior to the study, the feasibility of procuring a syringe washer had been investigated, but it had seemed difficult to justify the sizable expenditure in terms of volume of syringes being washed. Procurement had therefore been deferred. Recently, however, the supervisor had received literature regarding a syringe and glassware washer, which, in addition to rendering the washing process less burdensome, appeared to have special features which would also relieve the problems of sorting and matching. It was felt that perhaps the combined total of time saved in the three activities would prove to be more substantiating justification than was that for washing alone. A supervisor of a Central Service Unit which had purchased the washer was contacted for further information. Her reply was encouraging in that she stated that in her estimation the washer was actually paying for itself, and she included facts from her time studies which seemed to demonstrate that fact.

The outstanding feature of the machine is said to be a specially designed series of holders and baskets for syringes which will accommodate any size syringe. Syringe baskets have open sides and are used with a simple cover lock and aluminum syringe holder. The holes in the syringe holder are arranged in pairs--a smaller hole for the plunger, and a

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larger one next to it for the corresponding barrel. Any number of holders may be purchased and they are interchangeable in the baskets.

This feature presented to us numerous possibilities. In the first place, each ward unit could be supplied with any number of racks on a routine basis according to demonstrated needs. As syringes were used they could be rinsed and deposited in the appropriate slots in the racks. Then, at the time of Central Service pick-up, the contents could be checked at a glance, and the racks placed on the bottom shelf of the carriage. Back in the department, the racks could be wheeled immediately to the washer, slid into the baskets and then into the machine in a matter of minutes where they would be carried through all washing cycles automatically. The racks could then be removed and transported to the processing area where assembling could be readily accomplished without the tedious task of matching numbers. Following this, the procedure would then progress as in the present method.

Since we did not actually have the washer in our Central Service unit, authentic time studies under circumstances peculiar to the department were not possible. However, by using appropriate facts selected from those submitted by the supervisor who was using the machine, a hypothetical process was outlined around our situational peculiarities. From this it was estimated that the average four

hundred syringes daily could be completely processed in nine steps, taking three hours and twenty minutes, and with a traveled distance of nineteen feet. A process chart depicting the hypothetical situation is presented in Figure 9.

In addition to the savings of ten steps and twenty-eight feet in traveled distance, a total savings of three hours and twenty-five minutes of aide time would be realized each day which could be diverted into other assembly line functions. According to Table II, the supervisor is spending fifty-one per cent of her time, or approximately four hours, in duties which might be considered assembly line functions. This one improvement, therefore, could conceivably relieve the supervisor of all but thirty-five minutes time in the assembly line. There is every reason to believe further that with most of her time free for effective supervision, increased production would ensue to the extent that thirty-five additional minutes of aide time could be salvaged from the three and one-quarter hours spent daily in miscellaneous, undirected activities.

The supervisor should also be relieved of the clerical and supply functions which further detract from her supervisory time. Nurses are not trained in these duties and should not be expected to assume them at the expense of those functions which only nurses can perform.

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PROCESS CHART
Job: Processing Syringes

Chart Begins: In Receiving Area

Chart Ends: At Autoclave

DETAILS OF HYPOTHETICAL METHOD

Steps	Description	Notes
1.	Bring into department in racks and carry to washer	Walk 9 feet
2.	Unload racks into washer baskets	Washer accommodates 4 baskets at one time.
3.	Load washer	
4.	Start washer	Washer goes through all cycles automatically. Steps 3 and 4 repeated 4 times, taking with repetitions, 20 minutes.
5.	Unload baskets onto wheeled table	
6.	Push table to process area	Walk 5 feet
7.	Inspect, assemble and package	Takes 3 hours
8.	Transport to autoclave carriage	
9.	Wheel to autoclave room and place in autoclave.	Walk 5 feet

Figure 9. Syringe Process Chart No. 2.

SUMMARY

	Present	Proposed	Difference
Steps	19	9	10
Time Expended	6'45"	3'20"	3'25"
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To relieve the staff nurse of tasks not requiring her skills presents an even greater challenge, the scientific accomplishment of which cannot be included in this paper. However, the following speculation is advanced. Enthused and encouraged by the results of their analysis of syringe processing, the workers expressed an interest in studying the other activities in the same fashion, and they have been encouraged to do so. There is no doubt that such a step by step analysis of the many facets of Central Service activities will result in any number of assembly line innovations designed to conserve time. Improvements are always possible to those who are open-minded enough to want to make them,[12] and the Central Service staff, through their sustained efforts and interest, have given every evidence of this trait.

In addition, the proposed reallocation of responsibilities to departments whose functions they rightfully are, and the proposed alterations in the physical plant will, when effected, further release manhours for diversion into assembly line functions. To trained industrial engineers, any considerable amount of walking is often an indication of a potential savings of time.[13] The proposed adjustments, in most instances, are designed to save steps and therefore, by the

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same token, can be regarded as time savers. As a result, the staff nurse can then devote more of her time to acquiring supervisory skills.

Edwin L. Crosby, M. D., Director of the American Hospital Association, expressed the following opinion in his foreword to How to Study Nursing Activities in a Patient Unit.

> Hospitals are spending far more money than ever before. They have greater responsibilities and are serving more patients than at any other time. This means that hospital administrators and nursing directors must look closely at all phases of management including personnel utilization. . . . If many hours of nurse time are being diverted from their true purpose and spent in work others can do, this trend must be corrected. . . . The first step in solving the problem is to analyze it.[14]

A Central Service unit supplies nursing units with everything, literally, from safety pins to respirators.[15] To attempt to include within the scope of one paper a description of the analysis of all its activities would indeed be presumptuous. The contents of this chapter, therefore, represent only a portion of the data accumulated to date, tracing only the beginning phases of what gives evidence of being an on-going, systematic investigation of a Central Service unit by its staff.

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CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

I. CONCLUSIONS

All facts obtained through critical analysis of Central Service facilities and activities having been classified and summarized, the following conclusions are drawn:

1. Available resources are being utilized to best advantage within the limitations imposed by staffing.
2. The present physical plant is an outgrown, outdated, costly arrangement which is hazardous in places, not conducive to rapid transit of supplies and equipment, nor in any way contributive to conservation of manhours.
3. Some work methods currently in use in the department are outdated and reptitious, with activities being performed manually which could be more expediently accomplished by mechanical means.
4. Workers are not being used to maximum potential in that nurses are performing clerical duties and tasks which could be

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3. Some work methods currently in use in the department are outdated and repititious, with activities being performed manually which could be more expedientiy accomplished by mechanical means.
4. Workers are not being used to maximum potential in that nurses are performing clerical duties and tasks which could be

performed by skilled aides, while skilled aides are performing tasks which should be the function of unskilled workers.

5. Central Service is carrying responsibility and accountability for items which should be the concern of other departments, thereby increasing costs and workload with no demonstrable return in terms of improved patient care.
6. Appropriate changes are indicated therefore, in order to promote maximum efficiency in operation.

Accordingly, the following recommendations many of which stem from suggestions of the workers themselves are presented. No effort has been made to categorize them as pertaining to either physical facilities or activities. It is presumed they are mutually dependent, with improvements in the one following as natural consequences of improvements in the other. Recommended modifications in the physical plant are depicted in Table III.

II. RECOMMENDATIONS

1. To relieve the bottleneck resulting from the present arrangement of the receiving area, the following is proposed:

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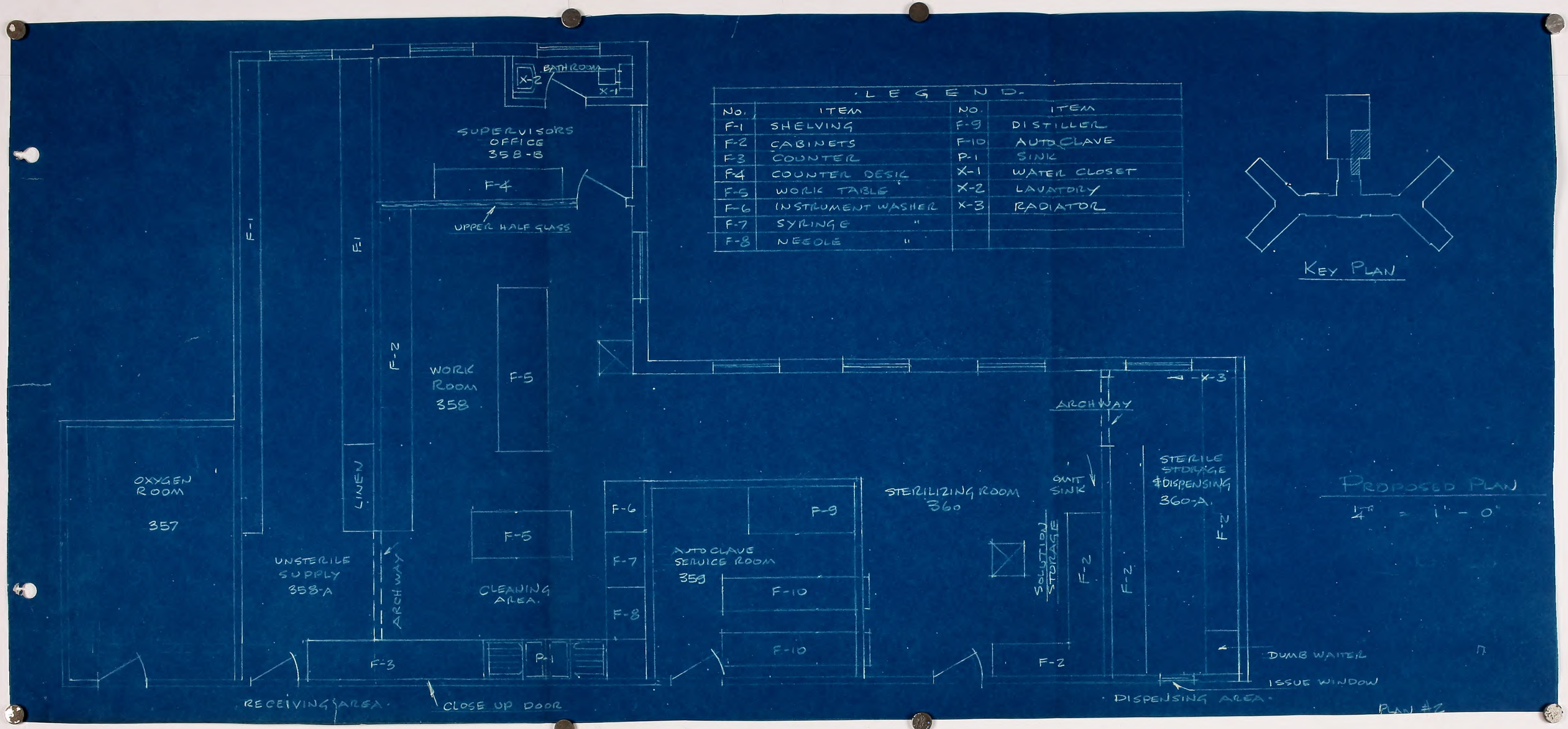
X-2
BATH ROOM
X-1
SUPERVISORS OFFICE 358-B
F-4
UPPER HALF GLASS
F-1
F-1
F-2
WORK ROOM 358
F-5
LINEN
OXYGEN ROOM 357
UNSTERILE SUPPLY 358-A
ARCH WAY
F-5
CLEANING AREA.
F-6
F-7
F-8
F-9
AUTO CLAVE SERVICE ROOM 359
F-10
F-10
F-3
P-1
RECEIVING AREA.
CLOSE UP DOOR
LEGEND
No. ITEM
F-1 SHELVING
F-2 CABINETS
F-3 COUNTER
F-4 COUNTER DESK
F-5 WORK TABLE
F-6 INSTRUMENT WASHER
F-7 SYRINGE "
F-8 NEEDLE "
No. ITEM
F-9 DISTILLER
F-10 AUTO CLAVE
P-1 SINK
X-1 WATER CLOSET
X-2 LAVATORY
X-3 RADIATOR
KEY PLAN
X-3
ARCHWAY
STERILIZING ROOM 360
UNIT SINK
STERILE STORAGE & DISPENSING 360-A.
SOLUTION STORAGE
F-2
F-2
F-2
F-2
DUMB WAITER
ISSUE WINDOW
DISPENSING AREA.
PROPOSED PLAN
1/4" = 1'-0"
PLAN #2

a. That the present entrance into Room #358 be closed off and the shelving along the corridor wall in Room #358A be removed; that a doorway then be cut into Room #358A from the corridor and either a sliding or an overhead door be installed to conserve space.

b. That a portion of the wall between Rooms #358 and #358A be removed to extend the archway, and that the receiving counter then be swung around through the archway to provide a long, unobstructed work surface from the entrance to the sink.

c. That a double basin steel sink with double drainboards be purchased and installed along the corridor wall. It is estimated that this sink would render productive the time presently lost in waiting for the one basin to drain and refill, and, through cutting down on the handling of items, would make it possible for one worker to accomplish the entire washing cycle in one half the time. In addition, it would accommodate two workers at one time if such seemed indicated.

d. That along the right hand wall where the present sink is located, the following be installed:

1) The instrument washer-sterilizer.

2) An automatic syringe and glassware washer, having racks specifically designed for the matched storing on ward units of used barrels and plungers. This will eliminate several steps in washing and processing and will cut down appreciably on the breakage which results from repetitious handling.

That this is a sizable investment is recognized. However, if it is generally accepted that industry will invest $20,000 to replace one $200 a month worker, then it is being proved over and over again in the Central Supply Room that such equipment as syringe and flask washers, needle cleaners and sharpeners, glove washers and conditioners are a good investment saving in personnel time, releasing workers for other tasks that cannot be done by machinery.[1]

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3) The needle cleaner attached to a drop leaf panel, with the air compressor relocated either underneath it in a cabinet, or preferably, in the basement. The purpose behind the drop leaf panel is to provide counter space for other activities during the hours the needle cleaner is not in use.

In this way, receiving, checking and washing will all be accomplished in the one area with a minimum of time and effort expended. In the continuous or progressive type of manufacturing, machines, process apparatus and equipment should be so arranged as to require the least possible movement on the part of the operator.[2]

2. To provide for future expansion in the sterilizing and solution room #360 in response to needs which are constantly growing, these proposals are offered:

   a. That the water still be moved into the space vacated by the instrument washer, and that consideration be given to installing in its place a second autoclave.

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Although the need for a second autoclave is not imminent, it seems wise to include it for future planning for, in the light of current trends, we can expect the demands on Central Service to become greater, not less, as time goes on.

b. That cyclomatic controls be installed on the present autoclave to expedite the sterilizing process, thereby eliminating the margin for human error and conserving on the time and effort of workers.

c. That an additional autoclave carriage be purchased which will eliminate the delay occasioned in the cooling of goods, and in unloading and reloading the one carriage which forces the autoclave to remain idle. According to Barnes,[3] the operator and the machine work intermittently on some types of work. That is, the machine is idle while the operator unloads and loads it, and the worker is idle while the machine is

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in operation. Not only is it desirable to eliminate idle time for the worker, but it is equally important that the machine be kept operating as near capacity as possible. The second carriage will have the added advantage of eliminating somewhat the double handling of packaged goods in the workroom as it may be loaded directly from the work table.

d. That a faucet be installed next to the autoclave for the hose attachment for flushing, thereby obviating the need for a sink in the room and eliminating a hazard as well.

e. That the sink be removed and replaced by a set of cabinets to provide additional sterile storage space.

f. That the archway between the sterilizing room #360, and the sterile storage room #360A, be enlarged to permit passage of the autoclave carriage, thereby eliminating another occasion of double handling of goods in storing.

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3. To consolidate supplies and equipment in non-sterile storage areas and to promote more advantageous location with respect to utilization and control, the following is proposed:

a. That room #356, directly adjacent to the department, and about to be vacated as a staff dining room, be allocated to Central Service for use as an equipment storage room. Equipment, such as the Drinker-Collins respirator, Stryker and Foster frames, low beds, suction machines and bed rails presently stored in four different areas, may then be relocated in the one area where maintenance and control will be assured, and the spaces presently occupied by them restored to more functional activity. In order to utilize the space in Room #356 to best advantage, the installation of suitable wall brackets is suggested.

b. That Central Service be relieved of the responsibility for storing and dispensing oxygen for use in other than patient areas, this to be expedited first by designating a more appropriate oxygen

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storage area and then by transferring control for such to the Supply Division who would be responsible for coordinating with Engineering the delivery of full cylinders and the collection of empty cylinders.

c. That shelving removed from Room #358 be installed in the oxygen Room #375 in the space vacated by removal of the surplus oxygen cylinders, and that this be used for the storage of gauges, masks and analyzers. In this way, all items used in oxygen therapy will be located in one room, thereby expediting service to patients.

d. That Central Service be relieved of responsibility for storing and dispensing intravenous solutions, and that these functions be assumed by Pharmacy. In this way, duplicate paper work will be eliminated, a more consistent source of supply assured, and badly needed storage space released in Room #358A.

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e. That all linens and supplies be then stored in room 358A, thereby consolidating assembly materials in the one area where they are readily accessible to personnel. Such an arrangement will also expedite requisitioning of supplies and promote economy.

4. To promote improved assembly methods, the following changes in workroom furnishings are suggested:

a. That the two stationary tables be replaced by two of standard height on wheels, one to have tilting bins on top and below, and the other to have an unobstructed work surface with drawers underneath. Thus, requirements for a spacious, comfortable work space with adequate dust-free storage for materials at the site of usage will be met, cutting down appreciably on time spent in trips to storage areas to replenish supplies. Workers are very much in favor of having definite stations at hand for materials and tools since this reduces fatigue and promotes automaticity. There can be no virtue

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in requiring the worker to exert unnecessary effort when by simply arranging materials and tools properly, the worker, with a little practice, will automatically perform the work in proper sequence at a rapid rate, and with a minimum expenditure of effort.[4] In addition to conserving time by providing storage areas at the site of usage, such tables, being freely movable, will more readily accommodate to the various processing activities. Also, being of standard height, alternate standing and sitting will be possible. The worker should be permitted to vary his position by either sitting or standing as he prefers. Such an arrangement enables him to rest certain sets of muscles, and a change of position tends to improve correlation thereby reducing the fatigue element.[5]

b. That the present chairs and stools be replaced by chairs of the type and height

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to permit good sitting posture. Good sitting posture is one in which the body is kept straight from the hips to the neck not allowing it to flex or bend at the waistline.[6] A good chair is adjustable and is rigidly built, with a form-fitting seat and back rest to support the lower spine. Foot rests are desirable to prevent workers from hooking their heels over chair rungs, which is uncomfortable and could result in foot strain.

c. That flourescent strip lighting be installed beneath the cabinets over the work counter to extend the entire length, thereby providing continuity and evenness of light and meeting requirements for proper illumination in an area where fine assembly takes place.

d. That continuous dual flourescent stripping with reflectors be installed over the work tables to reduce glare and provide

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[6] Ibid., p. 277

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> Where the work is of such a nature that visual perception is required for its satisfactory performance, the output is invariably increased when adequate illumination is provided.[7]

5. To improve ventilation, remove the undesirable consequences resulting from dust from the outside permeating sterile wrappers, and to decrease the incidence of respiratory ailments in the workers, the installation of air conditioning in the department is urged. It is contrary to the principles of sterile procedures to introduce dust or dirt into an area where clean articles are being assembled or where sterile articles are stored. To provide adequate ventilation for the aseptic working conditions required in the Central Service section, air conditioning is a necessity.[8]

Lighting, heating and ventilation have a definite effect upon the physical comfort, mental attitude, output and

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6. To provide suitable privacy in keeping with the duties and responsibilities of the supervisor and to promote more effective supervision, the following are proposed:

a. That room #358B be converted into an office and these changes be instituted:

1) Shelving and air compressor be removed.

2) A stationary window be cut in the wall between it and the workroom.

3) A counter desk be installed beneath the window and extending the length of the wall.

4) A telephone extension be installed.

When the Central Service department covers a large area, or if work areas are somewhat removed from the telephone, thought should be given to strategically placed extension telephones in order to conserve travel time and expedite service. While on the subject of telephones,

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consideration should also be given to placing an extension near the dumb waiter in the dispensing room for the same reasons.

5) The desk and filing cabinet be moved in from the workroom.

b. That a full time supply clerk be assigned to assume responsibility for the maintenance of records and controls and current cost and expense accounts; for the preparation of requests for supplies and equipment and the establishment and maintenance of a perpetual inventory; for the continuous revision of the procedure manual and guides. Such tasks presently being performed by the supervisor detract appreciably from time spent in supervision, and have precluded timely initiation of research studies which might have pointed up sooner many of the facts now brought to light in this survey.

7. How Central Service can best serve the Nursing Units must be determined by the needs of each. However, to promote more effective utilization of resources, the following is proposed:

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to provide twenty-four hour coverage. This will reduce work pressures and assure maximum use of the autoclave and the water still, both of which now stand idle fifteen hours daily. In addition, extended coverage will keep sets and supplies more consistently in circulation, cutting down on the need for greater quantities, and will tend to discourage the excessive accumulation of sterile goods on ward units.

b. That, following extension of coverage, complete delivery service of equipment and emergency supplies be provided to each ward unit by Central Service personnel. In this way, those engaged in patient care will have no need to leave the ward units to secure necessary items. This will also cut down considerably on repair expenses resulting from the misuse of equipment since all equipment will be set up and maintained by people who have a genuine interest in its upkeep. Improved service to patients will result as a natural consequence since

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c. That definite quotas of Central Service items be established on each unit and the responsibility for replacement be an automatic function of Central Service personnel on regularly scheduled visits. This will release ward personnel of the task of checking and ordering supplies, will discourage hoarding, and will assure a more economical and uniform use of all Central Service materials.

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Industry, however, attests to the fact that efficiency of a department may be achieved through labor saving devices, standardization of techniques and procedures and utilization of work simplification methods, all of which have been included in the proposed recommendations. Further, efficiency in operation is one of the universally accepted advantages to be derived from a well equipped, properly supervised and adequately staffed Central Supply. These conditions will also ensue as effects of the recommendations. It seems reasonable to expect then, that given the same conditions, like benefits will accrue here.

III. HUMAN RELATIONS COROLLARY

This study has not been wholly without tangible rewards, however. In the course of striving for the main objective, a highly interesting side light has developed in terms of human relations which may prove to be of even more lasting value than the actual rearrangement and reorganization of the Central Supply. This has come about as a result of the total involvement of personnel, a factor which it was originally felt might be a limitation.

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The study has been a worthwhile experience which has provided the staff with an opportunity to air their views and opinions and to make suggestions freely. As they have seen their suggestions accepted, they have gradually become assured that their opinion is truly valued and appreciated and they have experienced a deep sense of pride. What is more, through their sustained interest and continued recommendations, they are displaying new understandings which are mutually beneficial because they will undoubtedly have far reaching effects not only in Central Service but throughout all units.

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